SOLUTIA
Applied Chemistry, Creative Solutions

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St. Louis, Missouri 63166-6760
Tel 314-674-1000

January 13, 2000
(Via Registered Mail)

To: Mr. Kevin Turner
Environmental Scientist, OSC
70 Cargill Elevator Road
Cahokia, IL 62206

Mr. Michael McAteer
U. S. EPA - Region 5
77 West Jackson Boulevard (SR-6J)
Chicago, Illinois 60604-3590

Steve Johnson (DRT-14J)
U. S. EPA - Region 5
77 West Jackson Blvd.
Chicago, Illinois 60604-3590

Re: Revised - TSCA Technical Requirements Compliance Demonstration Document
Sauget Area I, Sauget and Cahokia, Illinois

Dear Kevin, Mike and Steve,

Enclosed for your review is a revised "TSCA Technical Requirements Compliance Demonstration" for Creek Segment B and Site M sediment Containment Cell for Sauget Area I, Sauget and Cahokia, Illinois. This revision incorporates the Agency's request for changes to the original document. These requests were made in the January 5, 2000 Containment Cell design review meeting held at the Sauget City Hall,. The revised document also incorporates comments from an additional discussion on the Containment Cell and other Area I matters, which took place at a January 6, 2000 meeting held at the Sauget Area I field trailer. We believe this document incorporates all Agency requests.

If there are remaining concerns, we would be pleased to discuss.

Sincerely,

D. M. Light
Manager, Remedial Projects
Solutia Inc.

cc: Bruce Yare - Solutia
Richard Williams - Williams Associates
Linda Tape - T/C

1.0 Introduction

Based on an evaluation of the factors identified in Section 300.415 of the National Contingency Plan (NCP) and attendant concerns for the risks to human health and the environment posed by sediments in Sauget Area 1 Creek Segment B and Site M, Solutia met with USEPA on October 19, 1999 to discuss implementation of a Time-Critical Removal Action to contain these sediments in an on-site, double-lined, TSCA-compliant cell constructed to RCRA minimum technology standards.

Solutia believes that a Time-Critical Removal Action is appropriate for the following reasons:

1) The threat of migration due to sediment mobilization and downstream transport during flood conditions. Sediments in Creek Segment B and Site M contain PCBs, Copper, Lead and Zinc with maximum concentrations of 17,000 ppm; 44,800 ppm; 24,000 ppm; and 71,000 ppm, respectively.

2) Although the culvert at the downstream end of Creek Segment B was blocked in 1965, the Village of Cahokia has installed a high level overflow to mitigate flooding due to the plugged culvert. In addition, the Village has attempted to pump water from Creek Segment B to Creek Segment C to prevent flooding of residential areas and Judith Lane. These actions, taken to protect homes and transportation routes, create a threat of migration due to downstream movement of sediments during flood conditions.

3) An evaluation of the factors identified in Section 300.415 of the National Contingency Plan and attendant concerns for risks posed by sediments in Creek Segment B and Site M.

During the October 19th meeting, which was attended by representatives from Superfund and TSCA , Solutia obtained an understanding of the substantive requirements for a TSCA cell and made a commitment to the Agency to submit a containment cell design on December 3, 1999. URS Greiner Woodward Clyde was authorized to prepare a RCRA minimum technology design that would meet TSCA requirements on October 28, 1999. In addition, URS was authorized to undertake a foundation evaluation at the location of the proposed containment cell. Current

plans call for constructing this cell immediately adjacent to the west bank of Dead Creek just south of Site G on property owned by Solutia.

This TSCA Technical Requirements Compliance Demonstration document is intended to demonstrate that the containment cell, as designed, will: 1) meet TSCA technical requirements, 2) protect public health and the environment and 3) not cause an unreasonable risk to human health and the environment. A Containment Cell Design and a Site Geotechnical Investigation are included as Appendix B and C, respectively of this document.

2.0 Site Description

2.1 Dead Creek

Sauget Area 1, centered on Dead Creek and its floodplain, is located in the Villages of Sauget and Cahokia, St. Clair County, Illinois. Dead Creek, an intermittent stream, runs approximately 17,000 feet from its upstream end at Queeny Avenue in Sauget, Illinois to its downstream end at Old Prairie Dupont Creek in Cahokia, Illinois. IEPA divided the creek into six segments during a 1988 site investigation (Figure 1):

Creek Segment A	Alton & Southern Railroad to Queeny Avenue
Creek Segment B	Queeny Avenue to Judith Lane
Creek Segment C	Judith Lane to Cahokia Street
Creek Segment D	Cahokia Street to Jerome Lane
Creek Segment E	Jerome Lane to Route 157
Creek Segment F	Route 157 to Old Prairie du Pont Creek

Creek Segment B (CS-B) extends for approximately 2000 ft. from its northern, upstream end at Queeny Avenue to its southern, downstream end at Judith Lane. In 1965, the culvert at the southern end of CS-B (Judith Lane) was blocked to prevent downstream flow of water.

2.2 Source Areas

Waste disposal was a common land use throughout the history of Sauget Area 1. Six source areas exist in the headwaters of Dead Creek: Site G, Site H, Site I, Site L, Site M and Site N (Figure 1). Site I, a closed municipal/industrial landfill is located in Creek Segment A. Sites G, H, L and M are located in Creek Segment B. Site G is a closed uncontrolled disposal area stabilized and covered by EPA in a 1995 response action. Site H is a closed municipal/industrial landfill. Site L is a backfilled wastewater impoundment. Site M, a former borrow pit, is an impoundment hydraulically connected to Dead Creek through an eight-foot wide opening in its southwestern corner. Site N, located in Creek Segment C, is a backfilled borrow pit.

Wastes in these source areas, which operated from the 1930s to the 1980s, came from a wide variety of municipal and industrial sources. Current Agency estimates indicate that these sites have an area of more than 30 acres and a volume in excess of 400,000 cubic yards.

2.3 Land Use

Creek Segment B is located in Sauget and Cahokia, Illinois while Site M is located in Cahokia. Land use surrounding CS-B and Site M is primarily commercial and agricultural. Commercial land use occurs along Route 3 (Mississippi Avenue), Queeny Road and Falling Springs Road. South of Sites G and L two small cultivated fields are used for soybean and winter wheat production. These fields separate Sites H and L from a small residential area of approximately 20 homes located on Walnut Street and Judith Lane in the southeastern corner of this creek segment. A small residential area is located immediately east of Sites H and I, across Falling Springs Road, with the nearest residence approximately 200 feet from these sites. The Sauget Village Hall is located immediately north of Site H on top of, or adjacent to, Site I.

2.4 Climate

Climate is continental with hot, humid summers and mild winters. Periods of extreme cold are short. The average annual rainfall in the area for the period from 1903 to 1983 was 35.4

inches, however, precipitation increased to 39.5 inches per year during the period between 1963 and 1988. The average annual temperature is 56°F; the highest average monthly temperature (79 °F) occurs in July and the lowest average monthly temperature (32 °F) occurs in January.

2.5 Hydrology

Creek Segment B and Site M lie in the floodplain of the Mississippi River, an area known as the American Bottoms. Generally, the land surface in undisturbed areas slopes from north to south, and from the east toward the river. Elevations in CS-B range from 400 to 410 feet above mean sea level (MSL) with little topographic relief except at Site G which was capped in 1995. Dead Creek serves as a surface water conduit for much of the Sauget and Cahokia area. It runs south and southwest through these villages and discharges to Old Prairie du Pont Creek which in turn discharges to the Cahokia Chute of the Mississippi River.

2.6 Geology

The Mississippi River floodplain contains unconsolidated valley fill deposits composed of recent alluvium (Cahokia Alluvium), which overlies glacial material (Henry Formation). The Cahokia Alluvium (recent deposits) consists of unconsolidated, poorly sorted, fine-grained materials with some local sand and clay lenses. These recent alluvium deposits unconformably overlie the Henry Formation which is Wisconsinian glacial outwash in the form of valley train deposits. The Henry Formation is about 100 feet thick. These valley-train materials are generally medium to coarse sand and gravel and increase in grain size with depth. Unconsolidated deposits are underlain by bedrock of Pennsylvanian and Mississippian limestone and dolomite with lesser amounts of sandstone and shale.

2.7 Water Resources

Domestic Water Supply - Groundwater is not used as a drinking water source in Cahokia or Sauget. In fact, the Village of Sauget prohibits the use of groundwater as a water supply source (Appendix A). Drinking water is obtained from the public water supply system which has a surface water intake in the Mississippi River approximately 3 miles north of Creek Segment B. Ten private wells are located within a mile of the proposed containment cell. Four of the five closest wells, located in a residential area approximately 1000 feet south of cell, were sampled as part of the Sauget Area 1 Support Sampling Plan (SSP) and the samples are currently being analyzed. The SSP is an EE/CA and RI/FS investigation currently being conducted by Solutia under an AOC with the Agency. Conversations with the well owners during sampling indicate that water from these wells is used for lawn watering only.

Industrial Water Supply - Industrial groundwater usage was very extensive in the past with peak usage occurring in 1962 when groundwater pumpage exceeded 35 million gallons per day. None of the industries in the vicinity of the site, Big River Zinc, Ethyl Corporation, Solutia and Cerro Copper, currently use groundwater.

Downstream Surface Water Intakes - The nearest downstream surface water intake on the Illinois side of the Mississippi River is located approximately 64 miles south of CS-B. This intake supplies drinking water to residents in the Town of Chester and surrounding areas in Randolf County, Illinois. The nearest water intake on the Missouri side of the river is located approximately 28 miles south of Sauget Area 1. The Village of Crystal City, Missouri located 28 miles south of Sauget Area 1, utilizes a Ranney well adjacent to the Mississippi River as a source for drinking water.

Agricultural Water Supply - The nearest irrigated land, other than residential lawns and gardens, is located in the Schmids Lake-East Carondelet area south of Old Prairie du Pont Creek.

3.0 Analytical Data Summary

In 1998 Ecology and Environment, at the request of the Agency, compiled all existing analytical data for Dead Creek (Volume 1, Sauget Area 1 Data Tables/Maps, February 1998). Maximum detected constituent concentrations for CS-B and Site M sediment and soil reported in this document are given below:

VOCs (parts per million)	
Acetone	5
Benzene	<1
2-Butanone	14
Carbon Disulfide	<1
Chlorobenzene	13
Ethylbenzene	4
4-Methyl-2-Pentanone	<1
Tetrachloroethane	<1
Toluene	5
Xylene	<1

PCBs (parts per million)	
PCBs	17,000

SVOCs (parts per million)	
Acenapthene	3
Acenaphthylene	<1
Alkylbenzene	<1
Anthracene	4
Benzo(a)anthracene	9
Benzo(b)fluoranthene	30
Benzo(k)fluoranthene	15
Benzo(g,h,I)perylene	13
Benzo(a)pyrene	10
Bis(2-ethylhexyl)phthalate	18
Butylbenzylphthalate	2
Chrysene	12
Chloronitrobenzene	240
2-Chlorophenol	<1
Dibenzo(a,h)anthracene	4

Metals/Inorganics (parts per million)	
Antimony	45
Arsenic	306
Barium	17,300
Beryllium	3
Boron	76
Cadmium	400
Chromium	400
Cobalt	100
Copper	44,800
Lead	24,000
Mercury	30
Nickel	3,500
Selenium	602
Silver	100
Strontium	430
Thallium	4

SVOCs (parts per million)	
Dibenzofuran	2
1,2-Dichlorobenzene	12,000
1,3-Dichlorobenzene	4
1,4-Dichlorobenzene	220
2,4-Dichlorophenol	<1
Di-n-butyl phthalate	<1
Di-ni-octyl phthalate	3
2,4-Dimethylphenol	<1
Fluoranthene	21
Fluorene	6
Hexachlorobenzene	2
Indeno(1,2,3-cd)pyrene	9
Isophorone	<1
2-Methylnapthalene	8
4-Methylphenol	<1
Napthalene	10

Metals/Inorganics (parts per million)		SVOCs (parts per million)	
Tin	32	4-Nitrophenol	3
Vanadium	100	Pentachlorophenol	2
Zinc	71,000	Phenanthrene	15
Cyanide	4	Pyrene	27
		1,2,4-Trichlorobenzene	3,700
		1,2,4-Trichlorophenol	5
		2,4,5-Trichlorophenol	<1
		2,4,6-Trichlorophenol	<1

80% (8 of 10) of the VOC maximum concentrations are between <1 and 10 ppm and two (20%) are between 10 and 20 ppm. SVOC maximum concentrations are grouped as follows: 26 of 39 (67%) between <1 and 10 ppm, 6 of 39 (15%) between 11 and 20 ppm, 3 of 39 (8%) between 21 and 50 ppm and 4 of 39 (10%) greater than 100 ppm. Metals maximum concentration distributions are 5 of 20 (25%) between 1 and 50 ppm, 5 of 20 (25%) between 51 and 100 ppm, 5 of 20 (25%) between 101 and 1,000 ppm and 5 of 20 (25%) greater than 1000 ppm.

Using organic concentrations of greater than 100 ppm and metals concentrations of greater than 1,000 ppm as a basis for focusing on constituents with the highest detected concentrations, the following summary statistics result:

	Maximum Concentration	95th Confidence Interval	Arithmetic Mean	Geometric Mean	Minimum Concentration
Organics (ppm)					
PCBs	17,000	5,200	9,706	108	<1
1,2-Dichlorobenzene	12,000	9,675	1,367	10	<1
1,2,4-Trichlorobenzene	3,700	1,679	342	11	<1
Chloronitrobenzene	240	236	203	201	170
Inorganics (ppm)					
Zinc	71,000	53,350	14,126	5,047	30
Copper	44,800	36,050	11,186	2,890	27
Lead	24,000	2,795	1,313	319	6
Barium	17,300	8,578	2,400	1,089	41
Nickel	3,500	3,000	937	367	12

4.0 Sediment Volume

4.1 Creek Segment B and Site M Estimated Sediment and Soil Volume

CS-B and Site M contain an estimated volume of 25,500 cubic yards of metal and organic-containing sediment and soil:

Creek Segment B Sediment	2000ft L x 50 ft W x 2 ft D	=	7,400 cy
Creek Segment B Creek Bed Soil	2000ft L x 50 ft W x 1 ft D	=	3,700 cy
Creek Segment B Floodplain Soil	2000ft L x 100 ft W x 1 ft D	=	7,400 cy
Site M Sediment	64,000 sq ft x 1.6 ft	=	3,500 cy
Site M Pond Bottom Soil	64,000 sq ft x 1 ft	=	3,500 cy
	Total	=	25,500 cy

4.2 Creek Segment C, D and E Estimated Sediment Volume

CS-C, D and E contain an estimated volume of 24,000 cubic yards of metal and organic-containing sediment:

Creek Segment C Sediment	1400ft L x 50 ft W x 2 ft D	=	5,200 cy
Creek Segment D Creek Bed Soil	1200ft L x 50 ft W x 2 ft D	=	4,400 cy
Creek Segment E Floodplain Soil	4000ft L x 50 ft W x 2 ft D	=	14,800 cy
	Total	=	24,400 cy

4.3 Time-Critical Removal Action Volume

The estimated volume of metal and organic-containing sediment and soil in Creek Segment B and Site M is 25,500 cubic yards and CS-C, D and E contain an estimated volume of 24,000 cubic yards of metal and organic-containing sediment, a total of 49,500 cubic yards impacted sediment and soil. An on-site containment cell with a volume of 50,000 cubic yards can be used to contain sediment and soil from CS-B and Site M and sediment from CS-C, D and E.

4.4 Sediment Removal

Current plans call for removing sediments from Creek Segment B and Site M by working in the dry. Storm water will be diverted around Creek Segment B work areas using temporary berms, sheet piling or similar diversion structures or it may be pumped around these work areas and discharged downstream. Runoff from disturbed work areas will be routed to a gravel and sand filter dam at the downstream end of CS-B and then discharged downstream.

Site M will be hydraulically isolated from Dead Creek by closing the opening between Creek Segment B and the southwestern corner of Site M using compacted soil, sheet pile or other suitable method. Impounded water will be will be routed to a gravel and sand filter dam at the downstream end of CS-B and then discharged downstream.

Once sediments are removed from Creek Segment B and Site M, they will be dewatered, if necessary, using one or more of the following dewatering methods:

- In-Situ Gravity Dewatering
- In-Situ Solidification
- On-Site Gravity Dewatering
- On-Site Solidification

Dewatered sediments will pass the Paint Filter Test in the containment cell. It may be necessary to add a solidifying agent during compaction of the sediments in the containment cell in order to achieve this performance criterion.

Similar procedures will be used for sediments removed from Creek Segment C, D and E.

5.0 TSCA Technical Requirements Compliance Demonstration

This TSCA Technical Requirements Compliance Demonstration is intended to demonstrate compliance with the substantive requirements of Section 761.61(b) Performance-Based Disposal Regulations and Section 761.75 Technical Requirements for a Chemical Waste Landfill. Solutia's proposed containment cell (Appendix B) is designed to ensure that on-site containment of impacted sediments removed from Creek Segment B and Site M is protective of public health and the environment and will not cause unreasonable risk. Specific technical measures are included in the design to address risks associated with:

- Shallow Groundwater
- Groundwater Usage
- Leachate Migration
- Flooding
- Stormwater

These technical measures are discussed below.

5.1 Shallow Groundwater

Depth to groundwater at the site of the proposed containment cell ranges from 10 to 15 feet below ground surface. To mitigate risks associated with a depth to groundwater of less than 50 feet, a double-lined containment cell will be built above grade on top of a three ft. thick permeable, capillary barrier drain sloped to a collection sump. Bentomat® will be installed on top of the capillary barrier drain prior to construction of the containment cell. The cell will have a primary liner system with a leachate collection system and a secondary liner system with a leak detection system. Accumulated leachate will be removed regularly to minimize hydraulic head on the primary liner system. Three barriers will prevent any leachate generated in the containment cell from reaching the shallow water table: 1) the primary 60 mil HDPE liner and

leachate recovery system, 2) the secondary 60 mil HDPE liner and leak detection system and 3) the Bentomat® on top of the capillary barrier drain.

Since the capillary barrier drain and containment cell are being built above grade, it is unlikely that the water table will rise above the top of the drain. Sloping the capillary barrier drain so that accumulated water drains to a sump will prevent groundwater from reaching the bottom of the containment cell as will installation of the Bentomat® layer.

5.2 Groundwater Usage

Sauget and Cahokia are served by a public water supply system that obtains surface water from a Mississippi River intake located approximately three miles upstream of the proposed containment cell location. Groundwater is not used as a drinking water or industrial water supply source in Cahokia or Sauget. Since groundwater is not used as a water supply source, specific technical design measures are not needed to mitigate risks associated with groundwater use. If groundwater were used as a water supply source, technical measures taken to control risks associated with the shallow water table (described above) and leachate migration (described below) would also control risks associated with groundwater usage.

5.3 Leachate Migration

A number of technical measures are included in the design to mitigate risks associated with leachate migration: 1) containing dry solids (contained sediments will pass the Paint Filter Test) and not liquids, thereby preventing catastrophic release of liquids, 2) containing dewatered sediments in a double-lined cell with leachate collection and leak detection systems, 3) building the double-lined cell above grade and 4) placing a Bentomat® layer on top of the capillary barrier drain prior to construction of the overlying containment cell.

The cell will have a 60 mil, HDPE primary liner system with a leachate collection system and a 60 mil, HDPE secondary liner system with a leak detection system. HDPE is compatible with

PCBs. Any leachate draining from the fill will be collected and removed by the leachate collection system. Should the primary liner be breached, the secondary liner and leak detection system will allow collection and removal of leachate. Should the secondary liner system fail, the Bentomat® layer on top of the capillary barrier drain will act as an additional leachate migration barrier. Building the containment cell above grade will also mitigate the impact of any leachate migration because leachate will preferentially move horizontally when it encounters the Bentomat® layer. Should it move vertically into and through the Bentomat® layer, the capillary barrier drain will route it to a collection sump.

If leachate should reach the water table and migrate through the groundwater system, it will be detected in a timely fashion using monitoring wells. Appropriate responses will be initiated on detection. There are no downgradient groundwater users. Any impacted groundwater migrating beyond the site boundary would discharge to the Mississippi River which is about one mile west of the site.

5.4 Flooding

The proposed containment cell is not in a FEMA 100-year floodplain, however, it is located in the floodplain of the Mississippi River. Construction in a floodplain to improve environmental conditions is allowed by Executive Order. In addition, a floodwall and levee system, constructed by the US Army Corps of Engineers (USACE), protects the site from flooding. During the July 1993 flood, the largest recorded flood in St. Louis history, the Corps' flood protection system performed as designed and prevented the site of the proposed containment cell from being flooded. Site R, a closed and capped landfill in Sauget Area 2 outside the floodwall, was inundated during the 1993 flood. Floodwaters reached to just below the top of its vegetated clay cap and the side slopes survived intact as the water receded.

To mitigate the risk of flooding due to failure of the floodwall and levee system and/or failure of the lift station at the downstream end of Dead Creek, the containment cell will be built with flat slopes that will not erode as flood waters recede. To prevent the cap from floating during

inundation, trapped air will be vented and the cap will be covered with gravel. Gravel will be placed on the side slopes of the cell to prevent erosion during flooding.

5.5 Stormwater

Stormwater runoff will be routed to downchutes designed to handle flow from a 25 year, 24 hour storm.

6.0 Summary

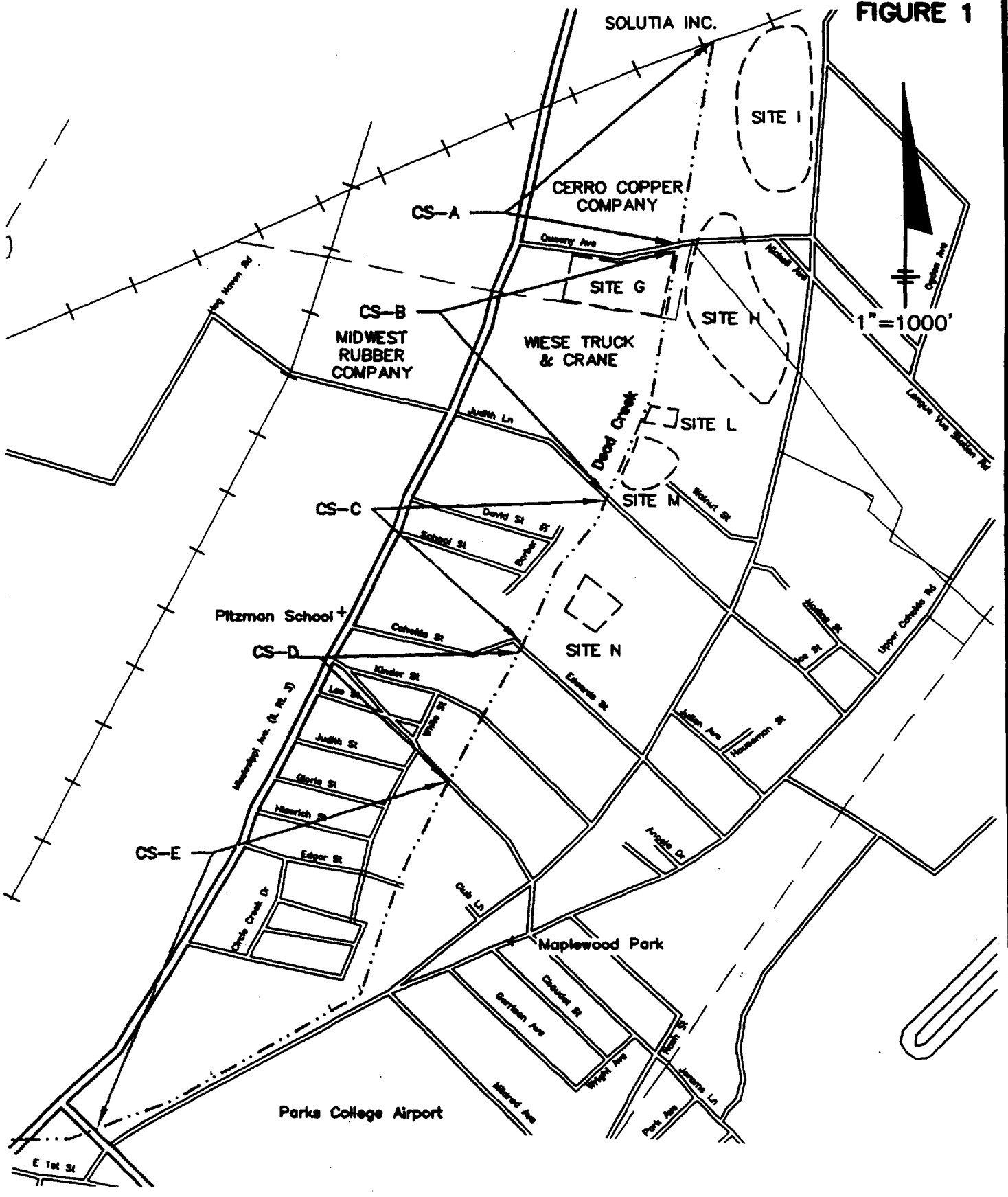
This TSCA Technical Requirements Compliance Demonstration describes the technical measures that will be taken to ensure that the proposed Creek Segment B and Site M on-site sediment containment cell is protective of public health and the environment and will not cause unreasonable risk. Specific technical measures incorporated in cell design include:

- Above grade construction
- Construction to RCRA minimum technology standards
- Construction on a three ft. thick, permeable capillary barrier drain sloped to a collection sump
- Installation of a Bentomat® layer on top of the capillary barrier drain
- Double lined cell
- 60 mil HDPE membranes
- Sand and/or gravel leachate collection system above primary liner
- Geosynthetic leak detection system above secondary liner
- Groundwater monitoring to detect leachate migration
- Slopes designed to resist erosion as flood waters recede
- Gravel armoring of potentially flooded slopes
- Gravel cover to resist floating and erosion during flooding
- Air venting to prevent cell floating during flooding

These risk mitigation measures will ensure that the proposed on-site containment cell is protective of public health and the environment and does not cause unreasonable risk due to shallow groundwater, leachate migration, flooding or stormwater. No risks are associated with groundwater usage because groundwater is not used as a water supply source. If it were, the technical measures described above would ensure that the proposed on-site containment cell does not cause unreasonable risk to public health and the environment due to groundwater usage.

Figures

FIGURE 1



TSCA TECHNICAL REQUIREMENTS COMPLIANCE DEMONSTRATION
FILL AREA AND CREEK SEGMENT LOCATION MAP
SAUGET and CAHOKIA, ILLINOIS

12/3/99

Appendix A

Sauget Groundwater Use Ordinance

ORDINANCE NO. 99-5

AN ORDINANCE PROHIBITING THE USE OF GROUNDWATER AS A POTABLE WATER SUPPLY BY THE INSTALLATION OR USE OF POTABLE WATER SUPPLY WELLS OR BY ANY OTHER METHOD

WHEREAS, certain properties in the Village of Sauget, Illinois, have been used over a period of time for commercial/industrial purposes; and

WHEREAS, because of said use, concentrations of certain chemical constituents in the groundwater beneath the Village may exceed Class I groundwater quality standards for potable resource groundwater, as set forth in 35 Illinois Administrative Code Part 620, or Tier 1 residential remediation objectives, as set forth in 35 Ill. Adm. Code Part 742; and

WHEREAS, the Village of Sauget desires to limit potential threats to human health from groundwater contamination while facilitating the redevelopment and productive use of properties that are the source of said chemical constituents;

NOW, THEREFORE, BE IT ORDAINED BY THE VILLAGE COUNCIL IN THE VILLAGE OF SAUGET, ILLINOIS:

Section One: Use of groundwater as a potable water supply prohibited.

The use or attempted use of groundwater from within the corporate limits of the Village as a potable water supply by the installation or drilling of wells or by any other method is hereby prohibited.

Section Two: Penalties

Any person violating the provisions of this ordinance shall be subject to a fine of up to $100.00 for each violation.

Section Three: Definitions.

"Person" is any individual, partnership, co-partnership, firm, company, limited liability company, corporation, association, joint stock company, trust, estate, political subdivision, or any other legal entity, or their representatives, agents or assigns.

"Potable water" is any water used for human or domestic consumption, including, but not limited to, water used for drinking, bathing, swimming, washing dishes, or preparing foods.

Section Four: Repealer.

All ordinances or parts of ordinances in conflict with this ordinance are hereby repealed insofar as they are in conflict with this ordinance.

Section Five: Severablity.

If any provision of this ordinance or its application to any person or under any circumstances is adjudged invalid, such adjudication shall not affect the validity of the ordinance as a whole or of any portion not adjudged invalid.

Section Six: Effective Date.

This ordinance shall be in full force and effect from and after its passage, approval and publication, as required by law.

INTRODUCED AND READ FOR THE FIRST TIME: October 12, 1999

READ FOR THE SECOND TIME:
(under suspension of rules): October 12, 1999

READ FOR THE THIRD TIME:
(under suspension of rules): October 12, 1999

ADOPTED AND ENACTED: October 12, 1999

ROLL CALL VOTE:
Ayes: Adele, McDaniel, Rich, Cates, Thornton, Sauget
Nays: NONE
Absent: NONE
Unfilled Vacancy:

APPROVED: October 12, 1999

APPROVED:

Paul Sauget
President (mayor) Pro Temore

ATTEST:

Betty Lou Wilson
Village Clerk

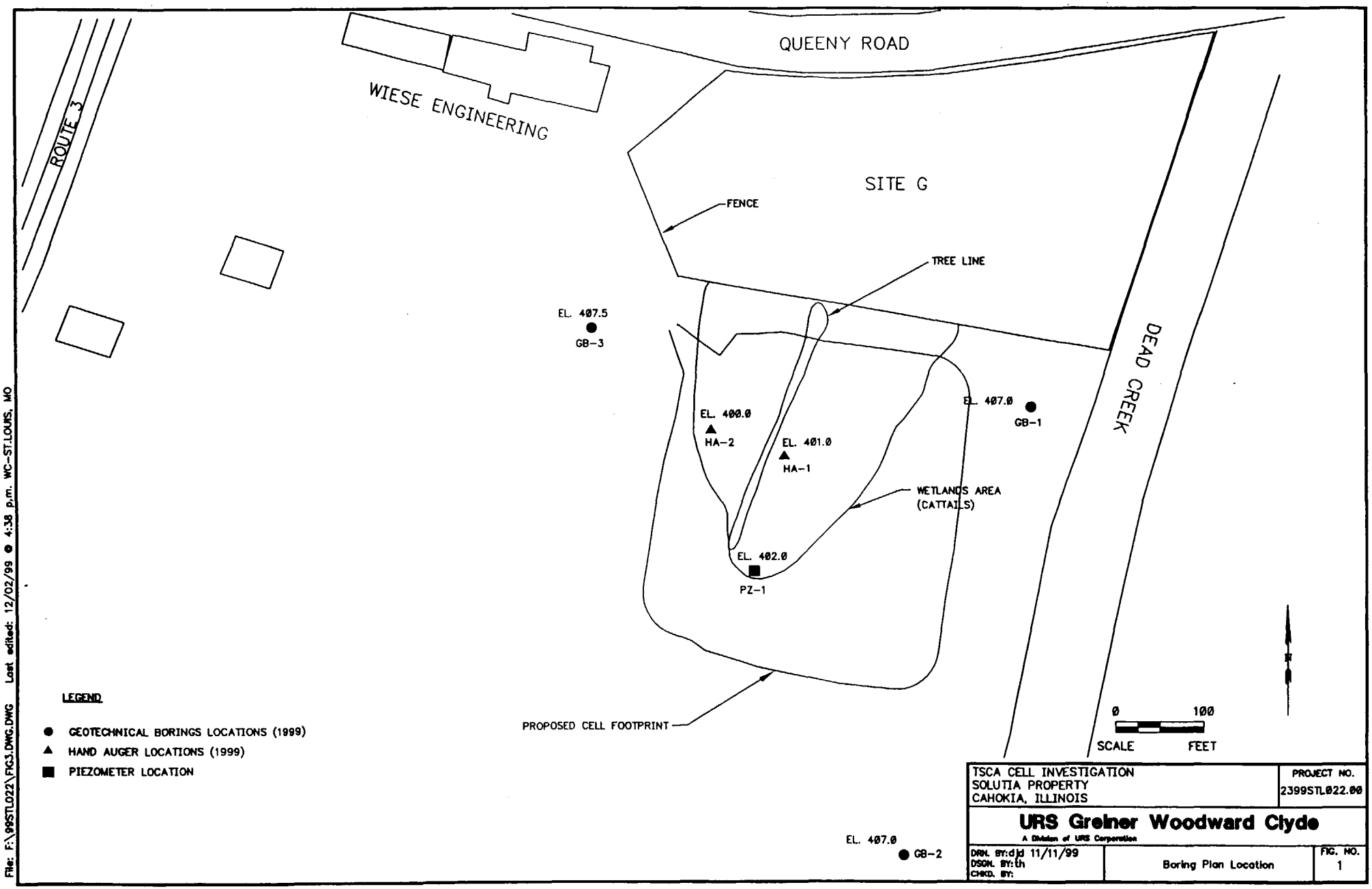
Appendix B

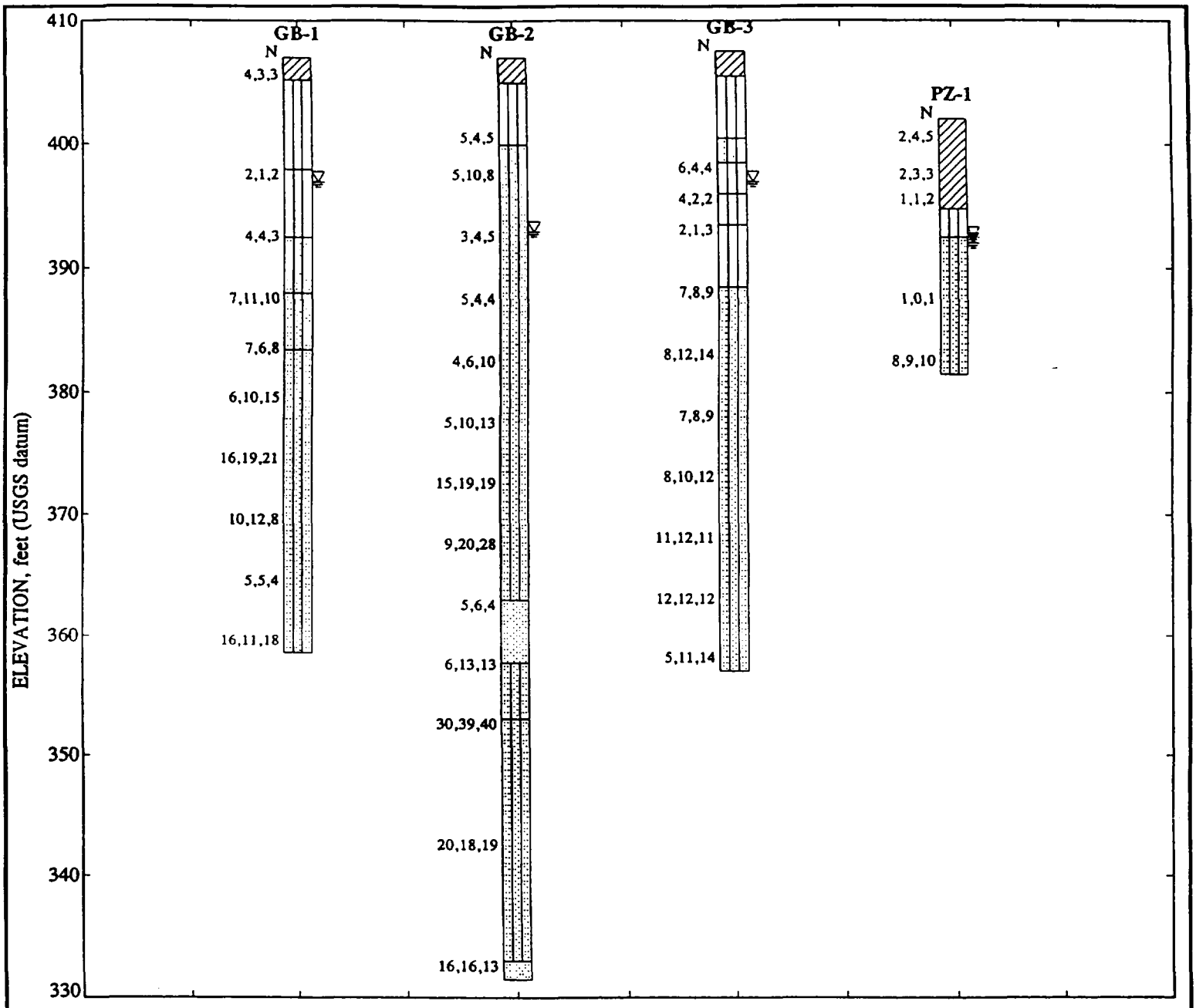
Containment Cell Design

(Under Revision to Increase Capacity to 50,000 Cubic Yards)

Appendix C

Site Geotechnical Investigation


QUEENY ROAD
WIESE ENGINEERING
ROUTE 3
SITE G
FENCE
TREE LINE
DEAD CREEK
EL. 407.5
GB-3
EL. 407.0
GB-1
EL. 400.0
HA-2
EL. 401.0
HA-1
WETLANDS AREA
(CATTAILS)
EL. 402.0
PZ-1
PROPOSED CELL FOOTPRINT
EL. 407.0
GB-2
N
0
100
SCALE
FEET
LEGEND
GEOTECHNICAL BORINGS LOCATIONS (1999)
HAND AUGER LOCATIONS (1999)
PIEZOMETER LOCATION
TSCA CELL INVESTIGATION
SOLUTIA PROPERTY
CAHOKIA, ILLINOIS
PROJECT NO.
2399STL022.00
URS Greiner Woodward Clyde
A Division of URS Corporation
DRN. BY: dd 11/11/99
DSGN. BY: th
CHKD. BY:
Boring Plan Location
FIG. NO.
1
File: F:\99STL022\FIG3.DWG Last edited: 12/02/99 @ 4:38 p.m. WC-ST.LOUIS, MO



Water level entry at time of drilling

Water level after drilling

P: Hydraulically pushed sample

RQD: Rock Quality Designation

7,10,15: Blows/6" penetration of sampler unless indicated otherwise

N-values equal sum of blows for last 12 inches

NOTE: These graphic logs depict generalized soil conditions. Refer to individual logs for details.

Legend:

- Low plastic CLAY
- Low plastic SILT
- Silty SAND
- SAND

Drawn by: djd	Checked by: gmm	Date: 11/17/99

Solutia, Sauget, Illinois

Project No. 2399STL022

Woodward-Clyde Consultants

Graphic Boring Logs **Figure 2.**

LOG of BORING No. GB-1

DATE 11/8/99 SURFACE ELEVATION, FT 407.0 DATUM USGS LOCATION See Figure 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
0				Firm, dark brown, moist, low plasticity Silty CLAY (CL)									Boring advanced with 4 1/4in. I.D HSA and Mud rotary
		4	100		405.2								
		3											
		3		Loose tan, dry, fine Sandy SILT (ML)	1.8				14				
			83										
5								0.5	20				
									19				
			83						18				
								0.5	22				
				Becoming moist					28				
									33				
									35				
					398.0								
		2	100	Very loose, tan, wet, SILT (ML); with	9.0				32				
10		1		trace of clay and some fine sand ▽									
		2							33				
				Becoming loose									
		4			392.5								
		4		Loose, wet, tan, fine Silty SAND (SM)	14.5								Switch to Mud Rotary
15		3											
									37				
					388.0								
		7	83	Medium dense, tan, wet fine Sandy SILT,	19.0								
20		11		to Silty SAND (SM/ML)									
		10							32				
		7	72		383.5								
		6		Medium dense, tan, wet, medium to fine	23.5								
		8		Silty SAND (SM)									

Completion Depth: 48.5 Ft.

Project No.: 2399STL022

Project Name: Solutia

Drilling Contractor: Redi

Water Depth: 10 ft., After ATD hrs.

_____ ft., After _____ hrs.

_____ ft., After _____ hrs.

Logged by: Tim Hicks

URS Greiner Woodward Clyde

LOG of BORING No. GB-1

DATE 11/8/99 SURFACE ELEVATION, FT 407.0 DATUM USGS LOCATION See Figure 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
25													
		6 10 15	83	Becoming gray, medium dense, medium to fine gravel									
30				Medium dense, gray Silty SAND (SM); with trace of medium to fine gravel									
		16 19 21	83	Becoming dense and less silty									
35													
		10 12 8	67	Becoming medium dense									
40													
		5 5 4	67	Becoming loose									
45				Loose, wet, gray Silty SAND (SM)									
		16 11 18		Becoming medium dense	358.5								
				Bottom of boring at 48.5ft.	48.5								

Completion Depth: 48.5 Ft.

Project No.: 2399STL022

Project Name: Solutia

Drilling Contractor: Redi

Water Depth: 10 ft., After ATD hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Logged by: Tim Hicks

URS Greiner Woodward Clyde

LOG of BORING No. GB-2

DATE 11/9/99 SURFACE ELEVATION, FT 407.0 DATUM USGS LOCATION See Figure 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
0			33	Brown, soft, moist, low plasticity Silty CLAY (CL)	405.0			1.0	22 23 19				Boring advanced with 4 1/4in. I.D HSA and Mud Rotary
				Loose. tan, dry, fine Sandy SILT (ML)	2.0								
5			58	Becoming Medium dense, gray with iron staining									
		5 4 5	49		400.0				28	34	10		
				Loose, moist, gray, fine Silty SAND (SM)	7.0				30				
10		5 10 8	89	Becoming medium dense, light brown and gray					26				
15		3 4 5	67	Becoming loose and saturated									Switched to Mud Rotary
20		5 4 4	78	Trace of fine gravel, becoming coarse to fine sand									
		4	67	Becoming medium dense with a trace of medium to fine gravel									

Completion Depth: 75.5 Ft.
Project No.: 2399STL022
Project Name: Solutia
Drilling Contractor: Redi

Water Depth: 14 ft., After ATD hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
Logged by: Tim Hicks

URS Greiner Woodward Clyde

LOG of BORING No. GB-2

DATE 11/9/99 SURFACE ELEVATION, FT 407.0 DATUM USGS LOCATION See Figure 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
25		6 10		Medium dense, gray, wet Silty SAND (SM); with a trace medium to fine gravel									
		5 10											
30		13		Medium dense, gray, wet Silty SAND (SM)					22				
		15 19	67	Becoming dense									
35		19							18				
		9 20	78	With fine gravel, decrease in silt content									
40		28			363.0								
		5 6	78	Loose, medium dense, moist, gray coarse to fine SAND (SP); with some fine gravel	44.0								
45		4											
		6	78		357.7 49.3								

Completion Depth: 75.5 Ft.
Project No.: 2399STL022
Project Name: Solutia
Drilling Contractor: Redi

Water Depth: 14 ft., After ATD hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
Logged by: Tim Hicks

URS Greiner Woodward Clyde

LOG of BORING No. GB-2

DATE 11/9/99 SURFACE ELEVATION, FT 407.0 DATUM USGS LOCATION See Figure 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
50		13		Medium dense, gray, moist, medium to fine SAND (SM/SP); with trace of silt					21				
		13			353.0								
		30	100	Very dense, gray, moist, fine Silty SAND (SM)	54.0								
55		39											
		40											
60				Very dense, gray, moist fine Silty SAND (SM)									
		20	83	Becoming dense with some silt, coarse to fine sand, trace of fine gravel									
65		18											
		19											
70													
					333.0								
		16	83		74.0								

Completion Depth: 75.5 Ft.
Project No.: 2399STL022
Project Name: Solutia
Drilling Contractor: Redi

Water Depth: 14 ft., After ATD hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
Logged by: Tim Hicks

URS Greiner Woodward Clyde

LOG of BORING No. GB-2

DATE 11/9/99 SURFACE ELEVATION, FT 407.0 DATUM USGS LOCATION See Figure 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
75		16		Becoming medium dense, gray, wet,	331.5								
		13		coarse to fine gravel with medium to fine SAND (SP)	75.5								
				Bottom of boring at 75.5ft.									
80													
85													
90													
95													

Completion Depth: 75.5 Ft.

Water Depth: 14 ft., After ATD hrs.

Project No.: 2399STL022 _____ ft., After _____ hrs.

Project Name: Solutia _____ ft., After _____ hrs.

Drilling Contractor: Redi Logged by: Tim Hicks

LOG of BORING No. GB-3

DATE 11/10/99 SURFACE ELEVATION, FT 407.5 DATUM USGS LOCATION See Figure 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
0			83	Medium stiff, dark brown, moist, low plasticity Silty CLAY (CL)	405.5				14				Boring advanced with 4 1/4in. I.D HSA and Mud Rotary
					2.0				6				
				Loose, tan, dry SILT (ML); with some sand and trace of clay					9				
			63										
5													
			83		400.5								
				Loose, tan, dry fine SAND (SM); with some silt	7.0				7				
									6				
					398.5				21				
		6	94	Loose, brown, moist, fine Sandy SILT (ML/SM)	9.0				8				
10		4											
		4		Becoming saturated ▽					35				
					396.0								
		4	83	Loose, gray, wet SILT (ML); with some sand	11.5								
		2											
		2											Switched to Mud Rotary
									36	32	7		
					393.5								
		2	83	Loose, brown, tan, wet Sandy SILT (ML)	14.0								
15		1											
		3											
									33				
					388.5								
		7	83	Medium dense, tan, gray, fine Silty SAND (SM)	19.0								
20		8											
		9											
									27				
		8	83										

Completion Depth: 50.5 Ft.

Project No.: 2399STL022

Project Name: Solutia

Drilling Contractor: Redi

Water Depth: 10.5 ft., After ATD hrs.

____ ft., After ____ hrs.

____ ft., After ____ hrs.

Logged by: Tim Hicks

LOG of BORING No. GB-3

DATE 11/10/99 SURFACE ELEVATION, FT 407.5 DATUM USGS LOCATION See Figure 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
25		12 14		Medium dense, tan, gray fine SAND (SM)									
30		7 8 9	67										
35		8 10 12	83	Decrease in silt content, becoming trace of silt, and trace ofr medium to fine gravel									
40		11 12 11	72	Decrease in silt content, trace of silt and trace of medium to fine gravel									
45		12 12 12	67	Medium dense, tan, gray, fine SAND (SM)					19				
		5	72										

Completion Depth: 50.5 Ft.
Project No.: 2399STL022
Project Name: Solutia
Drilling Contractor: Redi

Water Depth: 10.5 ft., After ATD hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
Logged by: Tim Hicks

LOG of BORING No. GB-3

DATE 11/10/99 SURFACE ELEVATION, FT 407.5 DATUM USGS LOCATION See Figure 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
50		11			357.0								
		14		Bottom of boring at 50.5ft.	50.5								
55													
60													
65													
70													

Completion Depth: 50.5 Ft. Water Depth: 10.5 ft., After ATD hrs.

Project No.: 2399STL022 _____ ft., After _____ hrs.

Project Name: Solutia _____ ft., After _____ hrs.

Drilling Contractor: Redi Logged by: Tim Hicks

12/2/99 WCCXS TL022

URS Greiner Woodward Clyde

LOG of BORING No. HA-1

DATE 11/15/99 SURFACE ELEVATION, FT 401.0 DATUM USGS LOCATION See Figure 1.

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
0				Firm, dark brown, low to medium Silty CLAY (CL)	399.5								
				Loose, tan, fine Sandy SILT (SM); with trace of clay	1.5 399.0								
				Bottom of Hand Auger at 2ft.	2.0								
5													

Completion Depth: 2.0 Ft.
Project No.: 2399STL022
Project Name: Solutia
Drilling Contractor: Redi
Logged by: Tim Hicks

Water Depth: _____ ft., After _____ hrs.
_____ ft., After _____ hrs.
_____ ft., After _____ hrs.

URS Greiner Woodward Clyde

LOG of BORING No. HA-2

DATE 11/15/99 SURFACE ELEVATION, FT 400.0 DATUM USGS LOCATION See Figure 1.

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
0				Firm, dark brown, low to medium plasticity Silty CLAY (CL)	398.5								
				Loose, tan, fine Sandy SILT (SM); with trace of clay	1.5 398.0								
				Bottom of Hand Auger at 2ft.	2.0								
5													

Completion Depth: 2.0 Ft.

Project No.: 2399STL022

Project Name: Solutia

Drilling Contractor: Redi

Water Depth: _____ ft., After _____ hrs.

_____ ft., After _____ hrs.

_____ ft., After _____ hrs.

Logged by: Tim Hicks

URS Greiner Woodward Clyde

LOG of BORING No. PZ-1

DATE 11/8/99 SURFACE ELEVATION, FT 402.0 DATUM USGS LOCATION See Figure 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	RECOVERY, %	DESCRIPTION	STRATUM EL / DEPTH	SYMBOL	PP, TSF	FIELD Qu,KSF	NMC, %	LL	PI	Qu, KSF	NOTES
0				Soft, moist, brown,low plasticity Silty CLAY									Boring advanced with 4 1/4in. I.D HSA
		2 4 5	100	Becoming stiff					31				
5		2 3 3	100	Becoming firm, medium plasticity mottled brown, gray			1.5		36	60	40		
		1 1 2	100		394.8								
				Very loose, wet, gray, Sandy SILT (ML); with medium to fine sand	7.2				36				
					392.5								
10				Loose, wet, gray, medium to fine SAND (SM); with some silt	9.5								
15		1 0 1	78	Very loose, wet, tan, fine SAND (SM); with a trace of silt									
20		8 9 10	88	Becoming medium dense	381.5								
				Bottom of boring at 20.5ft.	20.5								

Completion Depth: 20.5 Ft.

Project No.: 2399STL022

Project Name: Solutia

Drilling Contractor: Redi

Logged by: Tim Hicks

Water Depth: 9.5 ft., After ATD hrs.

10 ft., After 18 hrs.

ft., After hrs.

12/2/99 WCCXS TL022

URS Greiner Woodward Clyde

MONITORING WELL INSTALLATION REPORT

Well No. PZ-1

roject Solutia Location See Figure 1.

roject No 2399STL022 Installed By Redi Date 11/8/99 Time 1100

lethod of Installation 4 1/4in. H.S.A. Done 1150

LOG OF BORING AND WELL

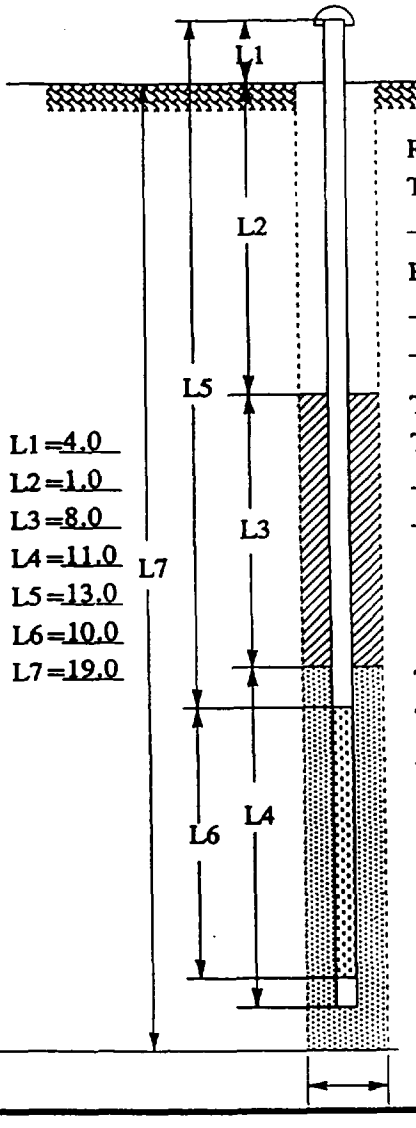
BORING

Depth In Ft.	Description	Symbol
0.00	Soft, moist, brown,low plasticity Silty CLAY	
	Becoming stiff	
	Becoming firm, medium plasticity mottled brown, gray	
7.20	Very loose, wet, gray, Sandy SILT (ML); with medium to fine sand	
9.50	Loose, wet, gray, medium to fine SAND (SM); with some silt	
	Very loose, wet, tan, fine SAND (SM); with a trace of silt	
	Becoming medium dense	
	Bottom of boring at 20.5ft.	

WELL

Type of Well

Ground Elev. Top of Riser Elev.



L1 =4.0
L2 =1.0
L3 =8.0
L4 =11.0
L5 =13.0
L6 =10.0
L7 =19.0

Riser Pipe I.D., in. 1in.

Type of Pipe PVC

Backfill Type Around Riser
Portland cement

Top of Seal Elevation

Type of Seal Material
See below

Top of Filter Elevation 8.0

Type of Filter Material
Quartz

Size of Opening, in. 0.01

Diameter of Well Tip, in. 1.0

Bottom of Screen Elevation 19.0

Bottom of Riser Elevation 19.0

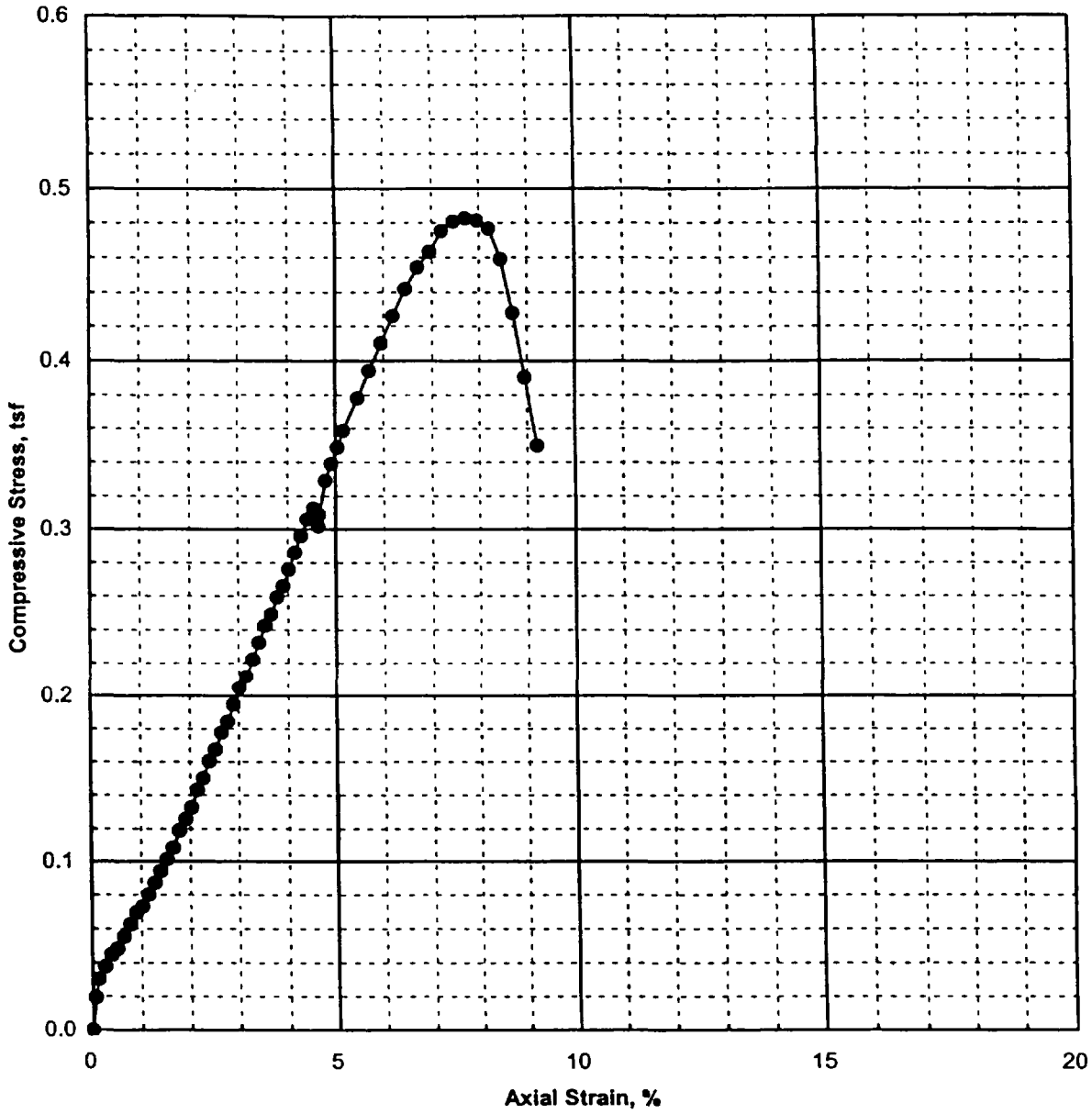
Bttm of Boring Elev. 19.0

Diameter of Boring, in. 4.2

emarks

Inspected By Tim Hicks

WOODWARD-CLYDE CONSULTANTS



Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	LL	PI	Length (in)	Diameter (in)
28.2	115.0	89.7			5.862	2.874

Description and/or Classification: ML, brown slightly to nonplastic SILT, trace f. sand

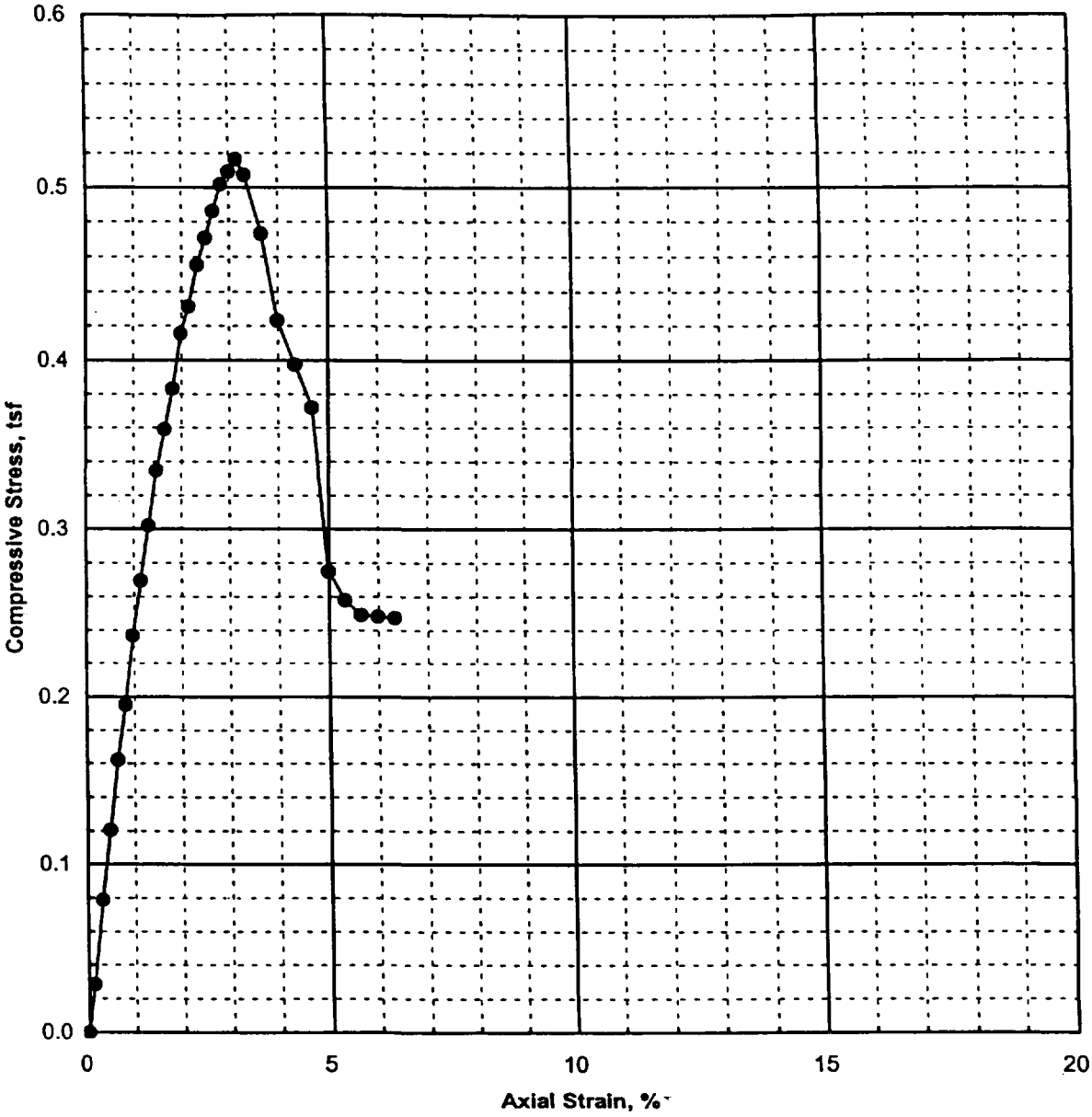
Test Summary

q_u (tsf)	Strain to Peak (%)	Strain Rate (%/min)
0.48	7.70	0.74

Tested by: BB
Test Date: Nov-17-99
Reviewed by: RJ

FAILURE SKETCH

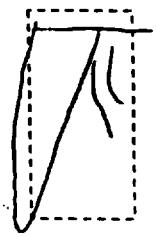
Project No. 23-99STL0022.01	SOLUTIA	UNCONFINED COMPRESSION TEST Boring: GB-1	
URS Greiner Woodward Clyde		Sample: A Depth:6.45	November 1999



Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	LL	PI	Length (in)	Diameter (in)
20.4	106.3	88.4			2.959	1.886

Description and/or Classification: ML, brown slightly to nonplastic SILT, trace f. sand



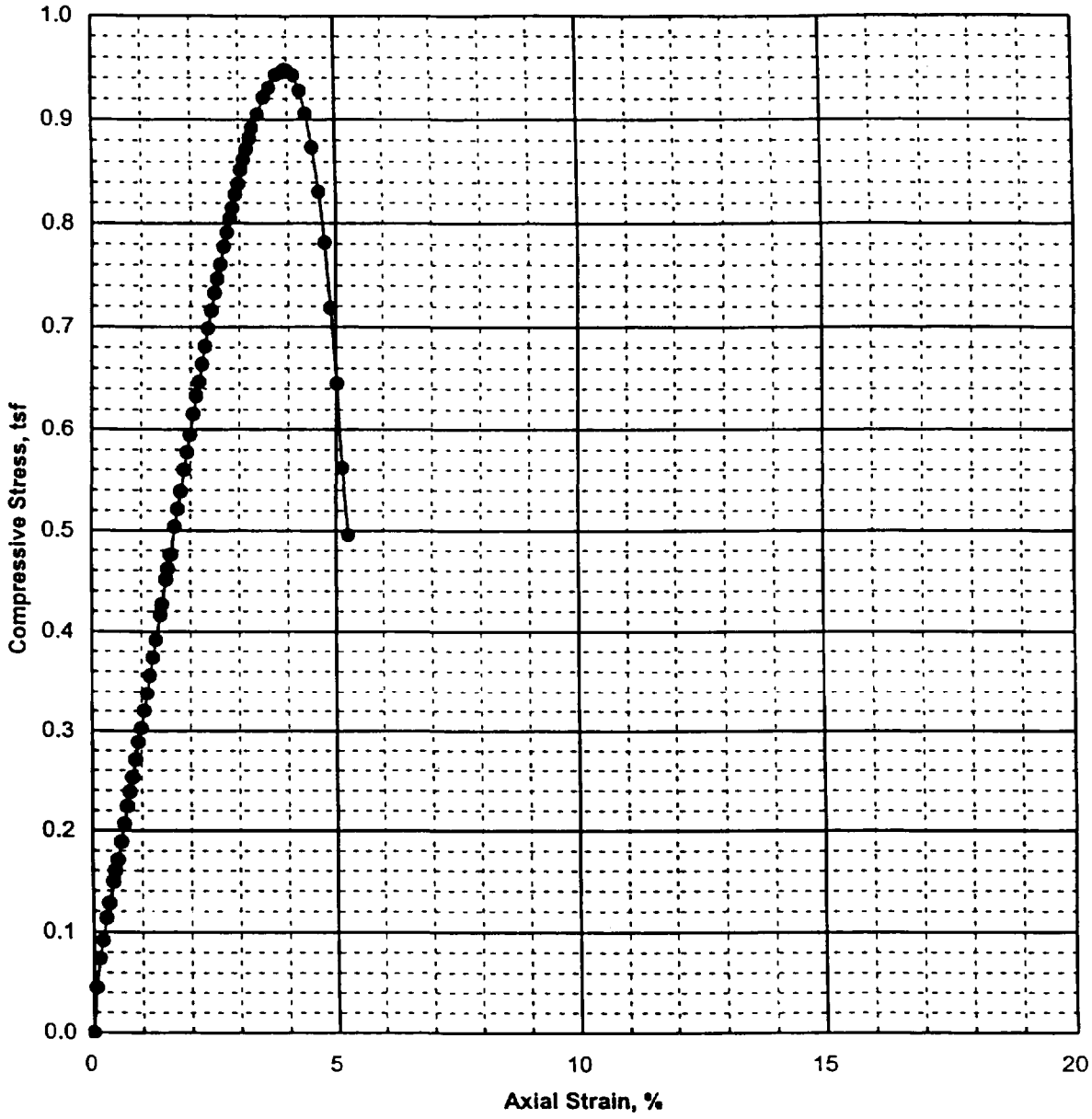
FAILURE SKETCH

Test Summary

q_u (tsf)	Strain to Peak (%)	Strain Rate (%/min)
0.52	3.16	1.00

Tested by: BB
Test Date: Nov-18-99
Reviewed by: MJ

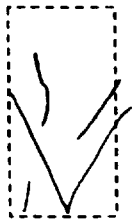
Project No. 23-99STL0022.01	SOLUTIA	UNCONFINED COMPRESSION TEST Boring: GB-1	
URS Greiner Woodward Clyde		Sample: A Depth:4.35-4.7	November 1999



Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	LL	PI	Length (in)	Diameter (in)
22.6	116.0	94.7			6.006	2.873

Description and/or Classification: ML, light brown s-np SILT, trace clay; top 1" CL, dark brown silty CLAY.



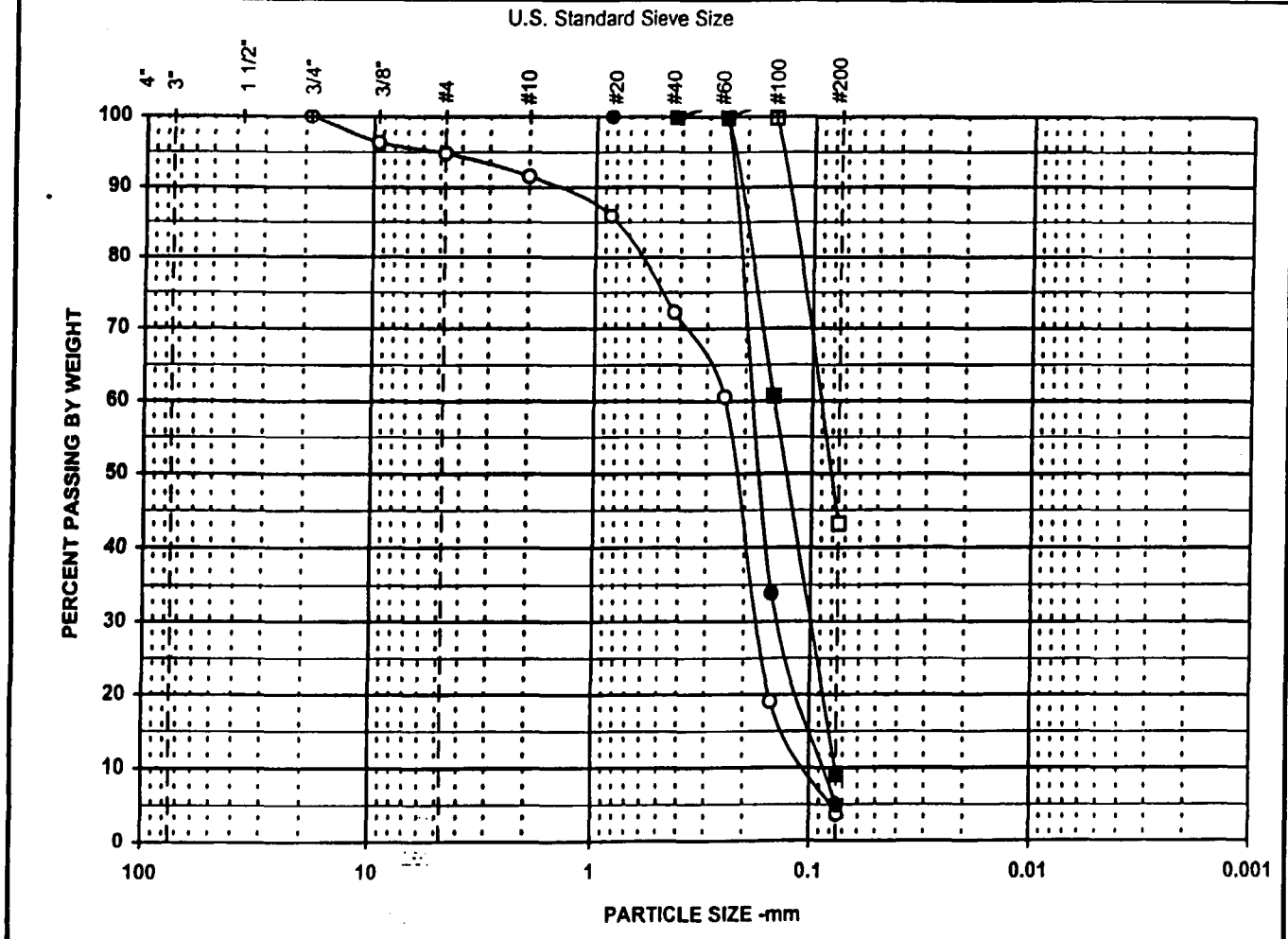
FAILURE SKETCH

Test Summary

q_u (tsf)	Strain to Peak (%)	Strain Rate (%/min)
0.95	3.96	0.73

Tested by: BB
Test Date: Nov-29-99
Reviewed by: 9/1

Project No. 23-99STL0022.01	SOLUTIA	UNCONFINED COMPRESSION TEST Boring: GB-2	
URS Greiner Woodward Clyde		Sample: A Depth:1.35	November 1999



Symbol	□	■	○	●
Boring	GB-1	GB-2	GB-2	GB-3
Sample				
Spec				
Depth	14-15.5	9-10.5	29-30.5	19-20.5
% +3"				
% Gravel			5.2	
% SAND	56.8	90.9	91.1	95.2
% FINES	43.2	9.1	3.7	4.8
% -2μ				
Cc		1.0	1.2	1.2
Cu		2.0	2.3	2.1
LL				
PL				
PI				
USCS	SM	SP-SM	SP	SP
w (%)	36.6	25.5	22.1	26.9

Particle Size	PERCENT FINER			
(Sieve #)	□	■	○	●
4"				
3"				
1 1/2"				
3/4"			100.0	
3/8"			96.3	
4			94.8	
10			91.5	
20			85.9	100.0
40	100.0	100.0	72.2	99.9
60	99.9	99.8	60.6	99.7
100	99.8	60.7	19.1	33.9
200	43.2	9.1	3.7	4.8

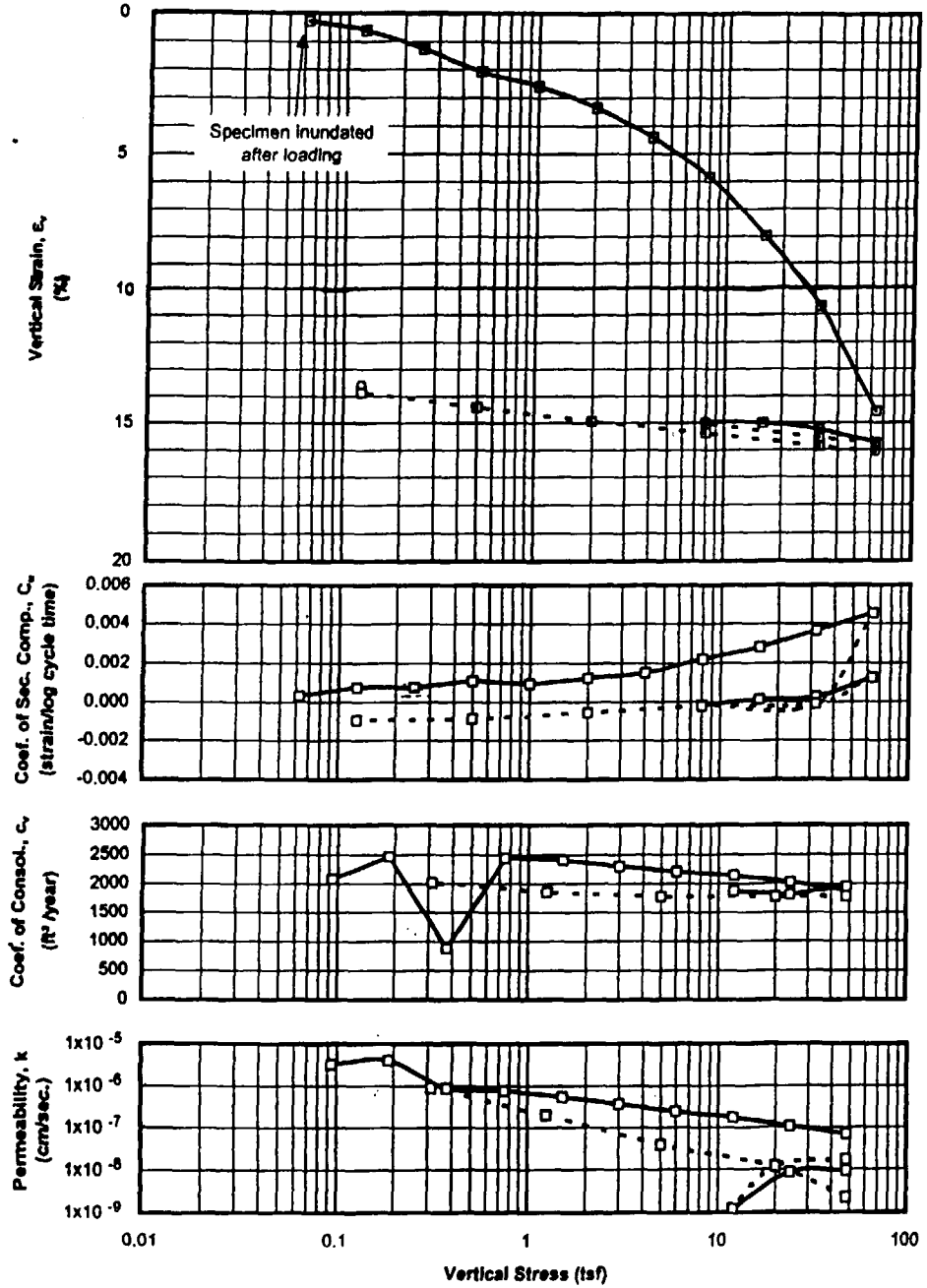
SYMBOL	DESCRIPTION AND REMARKS
□	dark brown silty f. SAND.
■	brown f. SAND, trace silt.
○	dark brown m-f SAND, trace gravel, c. sand, silt.
●	brown f. SAND, trace silt.

PARTICLE SIZE DISTRIBUTION

Solutia

Project No.		
23-99STL022	November 1999	Figure

URS Greiner Woodward Clyde



SAMPLE INFORMATION

Boring:	GB-1
Sample:	Spec C
Depth:	7.55 feet
Elevation:	
Type:	3-inch thin wall tube
	ML, brown nonplastic SILT, trace f. sand

SPECIMEN INFORMATION

(NOTE: Initial and final states refer to beginning and end of test)

Initial height:	0.61	inch
Diameter:	2.50	inch

Initial water content:	32.3	%
Initial total unit weight:	113.9	pcf
Initial dry unit weight:	86.1	pcf
Initial void ratio:	1.000	
Initial degree of saturation:	89	%
Final water content:	29.6	%
Final total unit weight:	122.9	pcf
Final dry unit weight:	94.8	pcf
Final void ratio:	0.818	
Final degree of saturation:	100	%

(assumed specific gravity = 2.76)

TEST SUMMARY

Construction Method:	Casagrande (Log)
Estimated preconsolidation stress (tsf):	12.8 (Range: 10.9 to 15.3)
Estimated in situ effective overburden stress (tsf):	
Compression Ratio (strain per log cycle stress):	0.128
Compression Index (void ratio per log cycle stress):	0.256
Swell Ratio (strain per log cycle stress):	0.008
Swell Index (void ratio per log cycle stress):	0.016
Recompression Ratio (strain per log cycle stress):	0.012
Recompression Index (void ratio per log cycle stress):	0.024
Remarks:	

LEGEND: □ End of primary ○ End of Stage ——— Loading - - - - - - - Unloading

Test Date: 11/17/99 Tested By: GET Checked By: GJ

	Solutia	ONE DIMENSIONAL CONSOLIDATION TEST Boring: GB-1 Depth: 7.55 feet
URS Greiner Woodward Clyde	Project No. 23-99STL0022	November 1999 Fig.

PROJECT:	Solutia					
PROJECT NO.:	23-99STL0022	Initial height:	0.613 inch	Final height:	0.554 inch	
BORING:	GB-1	Initial water content:	32.3 %	Final water content:	29.6 %	
SAMPLE:	Spec C	Initial dry density:	86.1 pcf	Final dry density:	94.8 pcf	
TEST:	C99216	Initial total density:	113.9 pcf	Final total density:	122.9 pcf	
DEPTH, feet:	7.55	Initial saturation:	89 %	Final saturation:	100 %	
BY:	GET	Initial void ratio:	1.000	Final void ratio:	0.818	
TEST DATE:	11/17/1999			Final strain:	9.8 %	

EQUIPMENT:
Load Frame No.: 5
Ring Diameter: 2.5 inch

SPECIMEN DESCRIPTION: ML, brown nonplastic SILT, trace f. sand

G	LL	PL	PI
2.76		np	

Load No.	Load (tsf)	d_{100} (inch)	t_{100} Strain (%)	t_{100} Void Ratio (-)	Final Strain (%)	Final Void Ratio (-)	c_v (ft^2/year)	C_α (strain/logt)	Constrained Modulus (tsf)	Permeability (cm/sec)
1	0.063	0.0017	0.277	0.995	0.345	0.994	89.22	0.0003	22.56	1.19E-07
2	0.125	0.0037	0.602	0.988	0.857	0.983	2086.38	0.0007	19.26	3.27E-06
3	0.250	0.0078	1.273	0.975	1.511	0.970	2467.32	0.0008	18.63	4.00E-06
4	0.500	0.0128	2.093	0.959	2.371	0.953	871.77	0.0011	30.47	8.63E-07
5	1.00	0.0160	2.610	0.948	2.905	0.942	2440.00	0.0009	96.78	7.61E-07
6	2.00	0.0206	3.359	0.933	3.832	0.924	2407.63	0.0012	133.40	5.44E-07
7	4.00	0.0271	4.410	0.912	4.911	0.902	2301.41	0.0015	190.31	3.65E-07
8	8.00	0.0360	5.862	0.883	6.533	0.870	2207.57	0.0022	275.50	2.42E-07
9	16.0	0.0490	7.994	0.841	9.213	0.816	2144.66	0.0028	375.26	1.72E-07
10	32.0	0.0657	10.708	0.786	11.603	0.768	2031.05	0.0036	589.49	1.04E-07
11	64.0	0.0893	14.564	0.709	15.759	0.685	1871.59	0.0046	829.93	6.80E-08
12	32.0	0.0955	15.562	0.689	15.531	0.690	1796.95	-0.0001	3208	1.69E-08
13	8.00	0.0922	15.023	0.700	14.940	0.702	1771.15	-0.0002	4455	1.20E-08
14	16.0	0.0920	15.005	0.700	15.050	0.699	1868.95	0.0001	45734	1.23E-09
15	32.0	0.0936	15.254	0.695	15.314	0.694	1809.76	0.0002	6429	8.49E-09
16	64.0	0.0966	15.751	0.685	16.073	0.679	1950.94	0.0013	6443	9.14E-09
17	32.0	0.0974	15.884	0.683	15.856	0.683	1778.30	-0.0001	24135	2.22E-09
18	8.00	0.0943	15.367	0.693	15.306	0.694	1775.23	-0.0002	4647	1.15E-08
19	2.00	0.0916	14.938	0.702	14.766	0.705	1778.33	-0.0006	1400	3.83E-08
20	0.500	0.0884	14.412	0.712	14.070	0.719	1855.80	-0.0009	285.14	1.96E-07
21	0.125	0.0850	13.863	0.723	13.580	0.729	2015.63	-0.0009	68.20	8.92E-07

Appendix D

Engineering Design Calculations

(In Preparation)